In *Existential Physics*, Hossenfelder looks beyond how physics is (un)done to examine "big questions" about science, academia, life, consciousness, and the nature of reality itself. She prefaces her discussion with "A Warning," letting readers with religious views know she is "both an agnostic and a heathen," and the book might "negatively affect some readers' mental health" (pp. xv–xvi). Readers may be "genuinely disturbed" and ask, "What sense does life make without free will? What is the point of human existence if it is just a random fluke? How can you not freak out knowing that the universe might blink out any moment?"

After the preface, her nine chapter titles are all questions, such as "How did the universe begin? How will it end?" "Why doesn't anyone ever get younger?" and "Are you just a bag of atoms?" Several chapters examine questions of special interest to Christians: "Has physics ruled out free will?" "Was the universe made for us?" and "What's the purpose of anything anyway?" Between chapters are four short conversations with fellow scientists, each beginning with the same question: "Are you religious?" Three respond negatively, but all, to one degree or another, hold to unscientific explanations of existence, even ones that are spiritually laden.

Hossenfelder thinks "Stephen Jay Gould got it right when he argued that religion and science are two 'nonoverlapping magesteria'" (p. 219). Employing that perspective, she emphasizes that science has limits, and its findings do not conflict with many religious beliefs. She closely examines the "fine-tuning" of physical constants (pp. 152–53) that make life possible, as well as competing explanations of them, both religious (i.e., a creator God) and scientific (i.e., the multiverse). Again, she notes the limits of science, admitting that some things are beyond our ability to test them experimentally. Given those limits, she allows people to decide, without prejudice, what they will believe.

Christian readers will appreciate Hossenfelder's openness to theism and her readiness to admit that science is limited, even doubting that it could ever settle some questions. They will also like her condemnations of philosophical naturalism and scientism, such as her statement that

> It's not that I want to be nice to religious people for the sake of being nice. To begin with, I'm not exactly known for being nice. But more important, scientists who claim, as Stephen Hawking did, that "there is no possibility of a creator," or as Victor Stenger has, that God is a "falsified hypothesis," demonstrate that they don't understand the limits of their knowledge. When prominent scientists make such overconfident proclamations, they make me cringe. (p. 218)

Even more, Hossenfelder's appreciation of creation and its religious significance is worthy of praise. She well understands, "Religion matters to many people in a way that science doesn't" (p. 219). Further, she notes:

> Scientists can learn from religion that not every get-together needs to come with a teachable lesson. Sometimes we just enjoy the company of like-minded people, want to share experiences, or look forward to a traditional ceremony. Science is severely lacking in such social integration. (pp. 220–21)

Perhaps she would enjoy the fellowship of an ASA Annual Meeting?

I recommend both books to *PSCF* readers. *Existential Physics* is more accessible, and of more value to a wider audience. Although Hossenfelder would not likely specify, readers may appreciate that "all things were created through him and for him," and "in him all things hold together" (Col. 1:16, 17). Without that knowledge, science can only reach dead ends.

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Psychology/Neuroscience

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DETERMINED: A Science of Life Without Free Will by Robert M. Sapolsky. Penguin Press, 2023. 528 pages. Hardcover; $35.00. ISBN: 9780525560975.

In his latest book, Robert Sapolsky takes on the monumental task of trying to convince his readers that personal agency, free will, and moral responsibility do not exist. As a staunch determinist, he argues for the philosophical position referred to as "hard incompatibilism" (determinism and free will are incompatible positions to hold simultaneously). Sapolsky readily acknowledges how challenging this task will be, settling for a more modest goal—to get readers to intellectually move in the direction that there is less free will than they previously assumed.

Sapolsky is an author who should be read, and his arguments, whether you agree with them or not, need to be discussed. He is a neuroscientist and primatologist, and holds the position of professor in biology, neurology, and neurosurgery at Stanford University. By the age of 30, he was awarded a MacArthur Foundation "Genius" grant. His writing is intelligent, clever, lucid, and at times hilarious, infuriating, and profane. Personally, I admire Sapolsky's command of the written word. In one sentence he can make the reader laugh by employing whimsical literary devices and in the next sentence he can be punishingly argumentative and scholarly. He writes with a chip on his shoulder, knowing that most people reading the book disagree with his extreme deterministic position. His prose is never dull or boring,

even when the subject matter addresses neurological topics such as brain anatomy or chemistry.

PSCF readers will be familiar with the lack of humility sometimes found in the writings of other scientists who are extreme determinists. Here, Sapolsky mirrors the language of these writers who have often asserted that our thoughts and actions are nothing more than the aggregation of prior biological antecedents. In his words, "when you behave in a particular way, which is to say when your brain has generated a particular behavior, it is because of the determinism that came just before, which was caused by the determinism just before that, and before that, all the way down" (p. 3). Sapolsky believes so strongly that we are nothing more (or less) than the "cumulation of biological and environmental luck" that he frequently crosses the line and lapses into arrogant outbursts such as: "How can you believe in free will by ignoring history?" (p. 85). He seems to have trouble accepting the reality that the vast majority of determinists adopt a position that allows for freedom of choice.

Early in the book, Sapolsky delineates some of the common attitudes held by people writing about free will. He describes a four-fold typology that encompasses almost everyone. His category of "compatibilists"—determinists who believe in free will—comprises over ninety percent of those who are intellectually engaged with the topic. Due to the popularity of this position, Sapolsky spends much of his book attacking it. One proponent of this view is the eminent scientist, Michael Gazzaniga, who co-founded the discipline of cognitive neuroscience and authored the book, *Who's in Charge? Free Will and the Science of the Brain*. Gazzaniga's book had a profound effect in shaping my own understanding and eventual embracing of the compatibilist position.

The first half of *Determined* is devoted to the notion that free will cannot be demonstrated. Two chapters are focused on *intent* since Sapolsky says a disproportionate amount of research on the free will debate revolves around this construct. Here he meticulously dissects the empirical literature on experimentation that emanated from Benjamin Libet's classic series of electroencephalogram (EEG) experiments in 1983. These experiments, along with dozens of others performed in the intervening 40 years, demonstrated that an electrophysiological "readiness potential" originating from the supplementary motor area of the prefrontal cortex is initiated 200–300 milliseconds prior to when people reported making a decision. Comparable results have been observed using fMRI imaging, demonstrating neuronal activity up to ten seconds prior to the time when subjects reported making a conscious decision.

These results have been used to support the notion that free will is "just a post hoc illusion, a false sense of agency" (p. 22). Interestingly, Sapolsky is highly critical of this research and concludes that these studies are irrelevant to the free will debate since none of them address the question: Where did that intent come from in the first place? For this question, Sapolsky spends an entire chapter on *where* intent comes from by elucidating neurobiological processes that occur seconds prior to an action, then hours prior, then days prior, then months prior, and so on. Essentially, he attempts to demonstrate how a series of biological antecedent events *could* produce a behavior without ever being able to show what *actually* occurred to lead to an action or thought.

Next, Sapolsky addresses the question: What if some moments aren't caused by anything preceding them? This could open the door to allow free will to sneak in. This is an important question since determinacy has been challenged by the sciences of chaos theory, emergent complexity, and quantum indeterminacy. Sapolsky uses six challenging chapters to argue that none of these three major developments pose insurmountable problems to his hard incompatibilism worldview. *PSCF* readers without a physics background may have difficulty understanding his arguments. Given the assumptions and uncertainties of these challenging areas, I was not convinced that Sapolsky's interpretation of the data was supportive of this book's overriding thesis that free will does not exist.

To Sapolsky's credit, *Determined* does not abruptly end with no discussion of what moral responsibility looks like in a world lacking free will. He devotes chapters to questions such as: If free will is a myth and our actions are the byproduct of amoral biological processes leaving us without moral culpability (as Sapolsky believes), will we not "run amok" engaging in all sorts of maladaptive and even heinous behaviors? He also delves into why people enjoy seeing others punished when they commit a crime or engage in morally reprehensible behavior. Lastly, since Sapolsky believes that people cannot be held ethically responsible for their behaviors, he insists we must change how society deals with those who break our laws since there is no ethical justification for blame and punishment. As an alternative to a retributive justice system, he proposes that we adopt a quarantine model similar to what the medical field uses to deal with patients stricken with a disease in which it is in society's best interest to remove them from the general population. Regardless of what you might think about Sapolsky's ideas, at least he is trying to find a solution to major social ramifications in case he has convinced you (and others) that free will is nothing more than an illusion.

Sapolsky includes a lengthy footnote stating he will not discuss any theologically based Judeo-Christian views that relate to free will, agency, and moral responsibility. This decision omits important questions that should be part of the conversation. *PSCF* readers may ask: How can an omniscient God who knows everything about the present, as well as the future, still allow for personal agency? Also, if the theological "hard determinists" are correct, and God has predetermined how the world is going to play itself out, how does the construct of moral responsibility fit into this framework? Finally, what is the interplay between supporting, as well as opposing, arguments for natural determinism and theological determinism? Complex issues, enlightened by faith, can guide us towards alternative understandings that will bring us closer to the truth. For me, the debate between free will and determinism is no exception.

If you are interested in exploring the question of free will and determinism from perspectives drawn primarily from scientific research findings—as opposed to philosophical or theological musings—I recommend this book. Even if you find the author's position of hard incompatibilism to be too extreme, the book is instructive and entertaining.

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Science and Faith

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CHRISTIANITY AND SCIENCE by Herman Bavinck, trans. and ed. N. Gray Sutanto, James Eglinton, and Cory C. Brock. Crossway, 2023. 240 pages. Hardcover; $32.99. ISBN: 9781433579202.

Among the architects of the neo-Calvinist movement is the Dutch theologian Herman Bavinck (1854–1921). In 1902, Bavinck moved from his professorship of theology at Kampen Theological Seminary to the Free University of Amsterdam, succeeding its founder Abraham Kuyper as the professor of theology. He wrote *Christelijke Wetenschap* early in his professorship in Amsterdam; this English edition has been translated midst the recent reinvigoration of Bavinck studies.

Christianity and Science was written in the same year as, and serves as a complementary expansion to, his treatise *Christian Worldview*. In *Christian Worldview*, Bavinck argues that modernity had failed the modern person. Modernity fragments the person, rendering their lived experience as lacking holistic integration. Christianity unites who we are, who we are becoming, and how we relate to the world in an organic unity. In *Christianity and Science*, Bavinck applies these ideas to scholarly inquiry and academic disciplines. He argues that the Christian worldview offers the believer unity in the life of the mind and, thus, uniquely equips the Christian for the academic endeavor in all fields of science.

What does Bavinck mean by "science"? In contrast to its common meaning of empirical disciplines, he uses the word more broadly, claiming that science encompasses all scholarly activity aimed at knowing truth. "The end goal of science can be none other than the knowledge of the truth—of the full, pure truth" (p. 127). It is for this reason the book covers disciplines from the natural sciences to literature, history, and theology. Bavinck's concept of science does not separate them but sees them as a unified whole.

Throughout his book, he postures an attitude of intellectual engagement between science and faith, and not of fundamentalist retreat. Bavinck stands in the Augustinian tradition of faith as enabling science: "Faith and science thus stand next to one another in relationship like conception and birth, like tree and fruit, like work and wage; knowledge is the fruit and wages of faith" (p. 58). He takes time to trace both the historic precedent of this idea within Christianity, and its later divergence culminating in the Enlightenment.

While still relevant to today's world, Bavinck's work is a challenging read for the contemporary reader, as his turn-of-the-century Dutch context is far removed from ours. Writing against the backdrop of positivism, he spends considerable time interacting with and arguing against it. Its power within disciplines is marked by its own flavor of religious ferocity. Remarkably, Bavinck seems prescient of the wane of positivism, about half a century before its eventual decline.

Positivist science, contrary to what it claims, is not presuppositionless. Bavinck lists several assumptions inherent to the practice of science and argues that no scholarly activity can be conducted from an intellectually neutral place. One's individual personality will always come to bear on the scientific inquiry. This is not a flaw of science but of its essence, for "Science remains bound to life" (p. 115). Building on an illustration Bavinck offers, the agriculturalist might not dig their fingers into the soil with the intimate knowledge of the farmer, but both will carry presuppositions concerning the earth, land, and community that radically influence their treatment and study of the same land.

Considering the natural sciences, Bavinck claims that "... all science, including that of nature, rests upon metaphysical presuppositions …" (p. 131). After listing several assumptions inextricable from the natural sciences, he argues that the implications of a worldview can be found even in natural sciences: "… natural science stands under the influence of a worldview, of